

# **SURVEYS OF NON-INDIGENOUS SPECIES IN THE COASTAL WATERS OF CALIFORNIA**

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# Main Points

- 1) Purpose of our program
- 2) Most recent surveys and results
- 3) Most invaded areas of the California Coast
- 4) Most common vectors
- 5) Accessing our data

# Purpose of Marine Invasive Species Program

## Ballast Water Act of 1999:

Directed DFG to Conduct Biological Surveys to Identify Non-indigenous Species (NIS)

## Main Questions:

- 1) To what extent has the California coast been invaded?
- 2) Which NIS have arrived in California via Ballast Water?

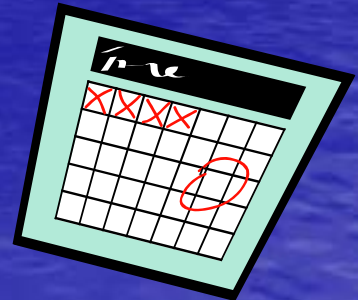
# Marine Invasive Species Program

To answer these questions:

- Initiated several baseline field surveys of ports and bays along CA Coast in 2000/2001.
- Submitted report to legislature detailing results in 2002.
- <http://www.dfg.ca.gov/ospr>

# More Legislation...

- 1) Removed sunset date
- 2) Expanded the scope of our study
- 3) Requires a Legislative report January 1<sup>st</sup> 2009 and updates every 3 years.



# Four Categories of Taxa



# **Recent Surveys**

- 1) Bays and Harbor Survey (2006)**
- 2) Outer Coast Survey (2004 & 2008)**
- 3) SF Bay Survey (2005)**

# Bays and Harbors Survey

## Sampled Major Ports and Small Harbors



## BAYS AND HARBORS SAMPLING SITES



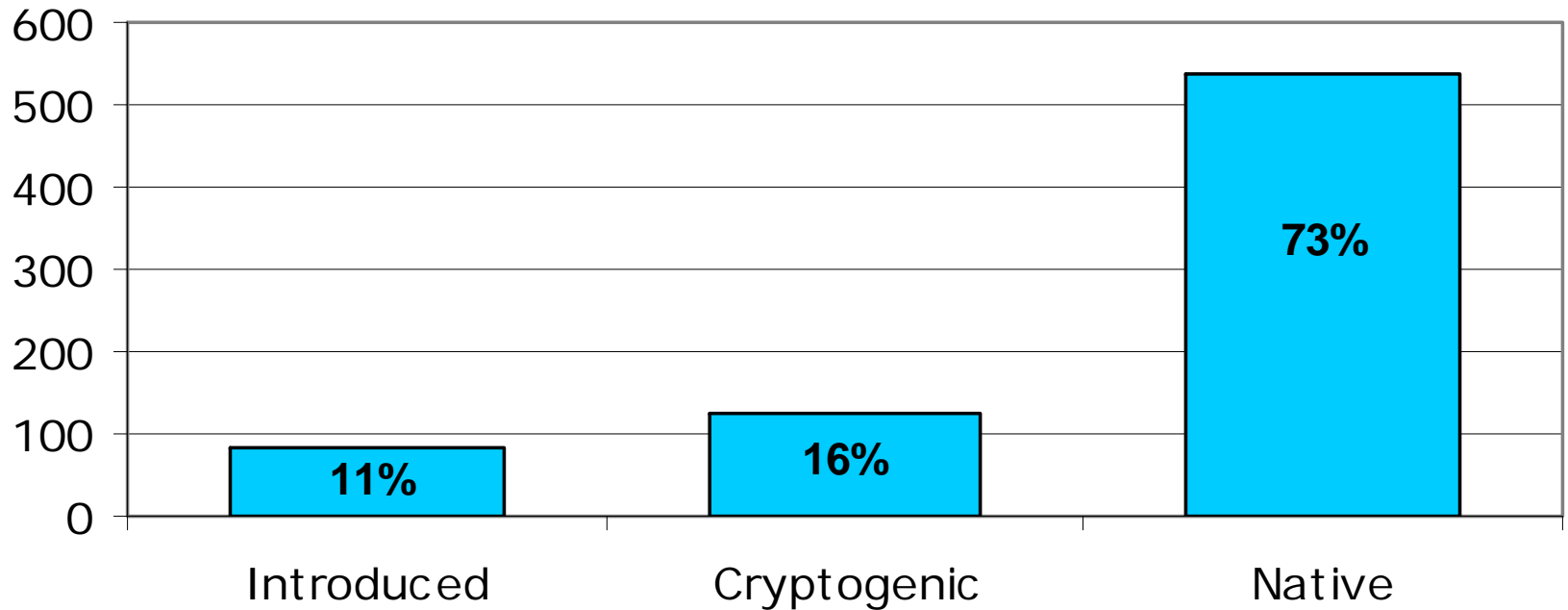
# Bays and Harbors Survey

- Three Main Habitats
  - 1) Rocky Epifaunal
  - 2) Sandy Infaunal
  - 3) Water Column



# Bays and Harbors Survey

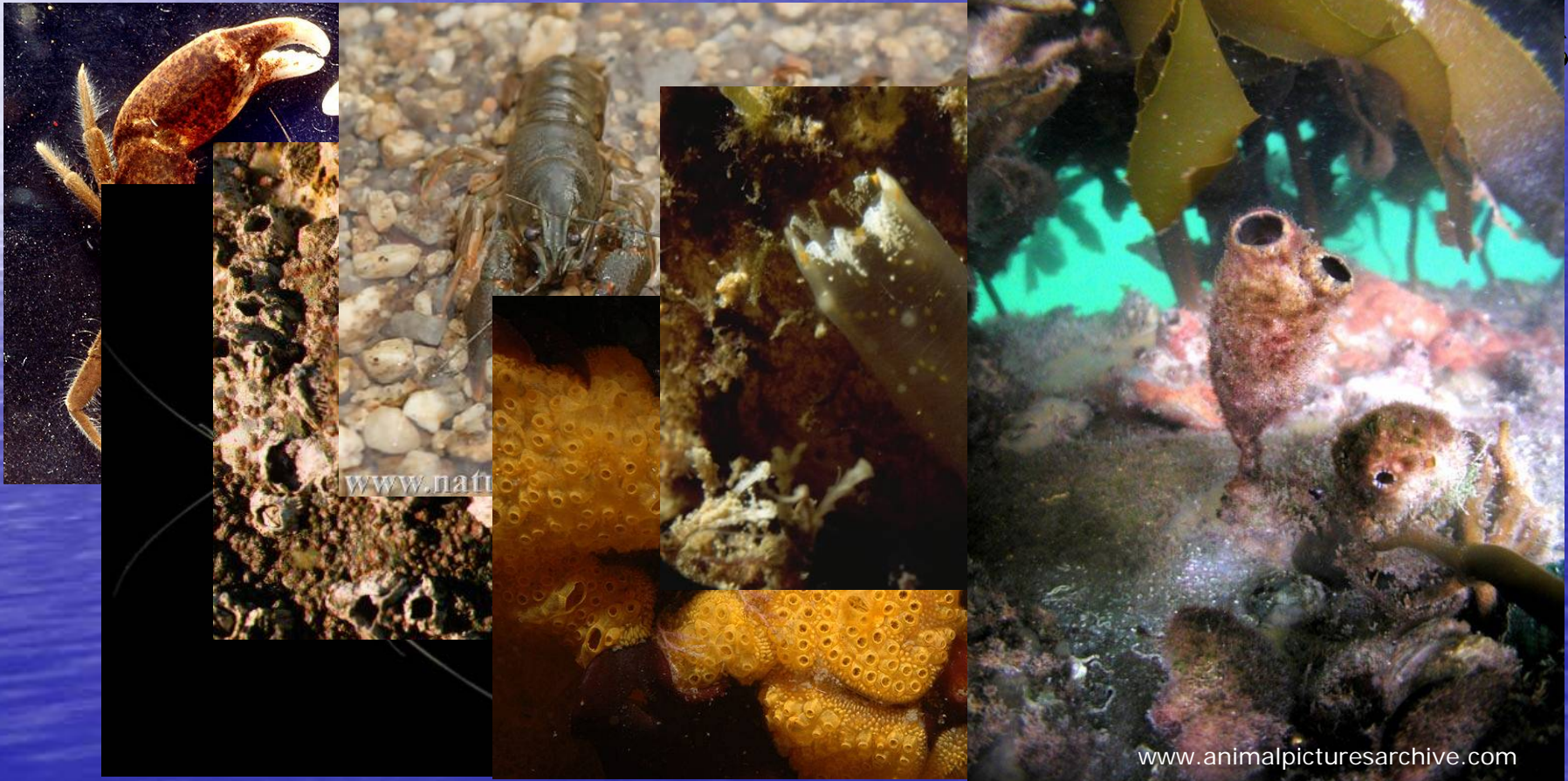
Number of Species per Classification



402 Unresolved Species: not identified to species level

# Bays and Harbors Survey

## Top Two Introduced Phyla:



# Outer Coast Survey

- Design was adapted from Bays and Harbor survey
- 22 Sites Sampled
- Focused on:
  - Whole community structures
  - Areas around prominent coastal headlands
  - Areas impacted by ballast water
- Initial Sampling Completed in 2005. Follow-up Sampling was Completed in 2008



## OUTER COAST SAMPLING SITES



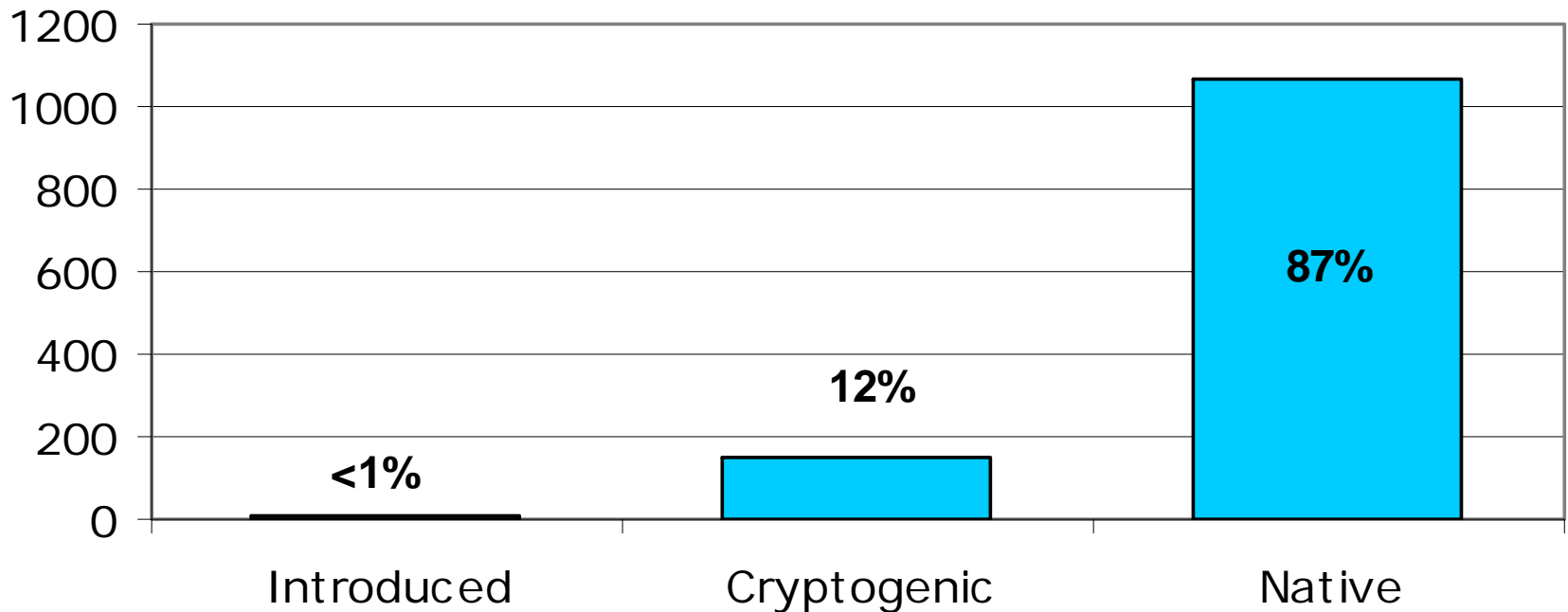
# Outer Coast Survey

- 4 Main Habitats
  - 1) Rocky Intertidal
  - 2) Sandy Intertidal
  - 3) Rocky Subtidal
  - 4) Sandy Subtidal



# Outer Coast Survey

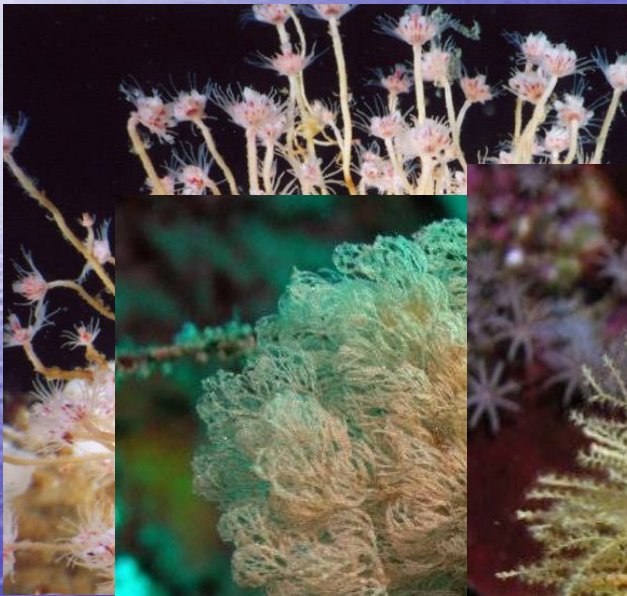
Number of Species per Classification



650 Unresolved Species: not identified to species level

# Outer Coast Survey

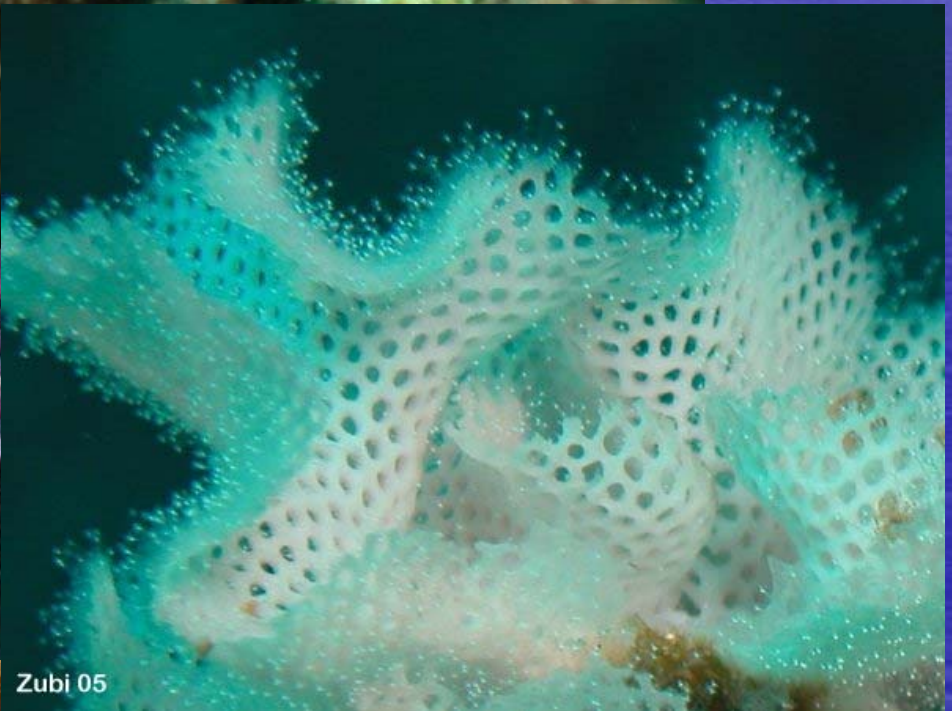
## Top Two Introduces Phyla:



Zubi 05



Zubi 05



Zubi 05



# San Francisco Bay Survey

- One of the most invaded ecosystems in the world?



- Field and laboratory studies complimented by literature and data reviews.

# **San Francisco Bay Survey**

## **4 Sub-regions:**

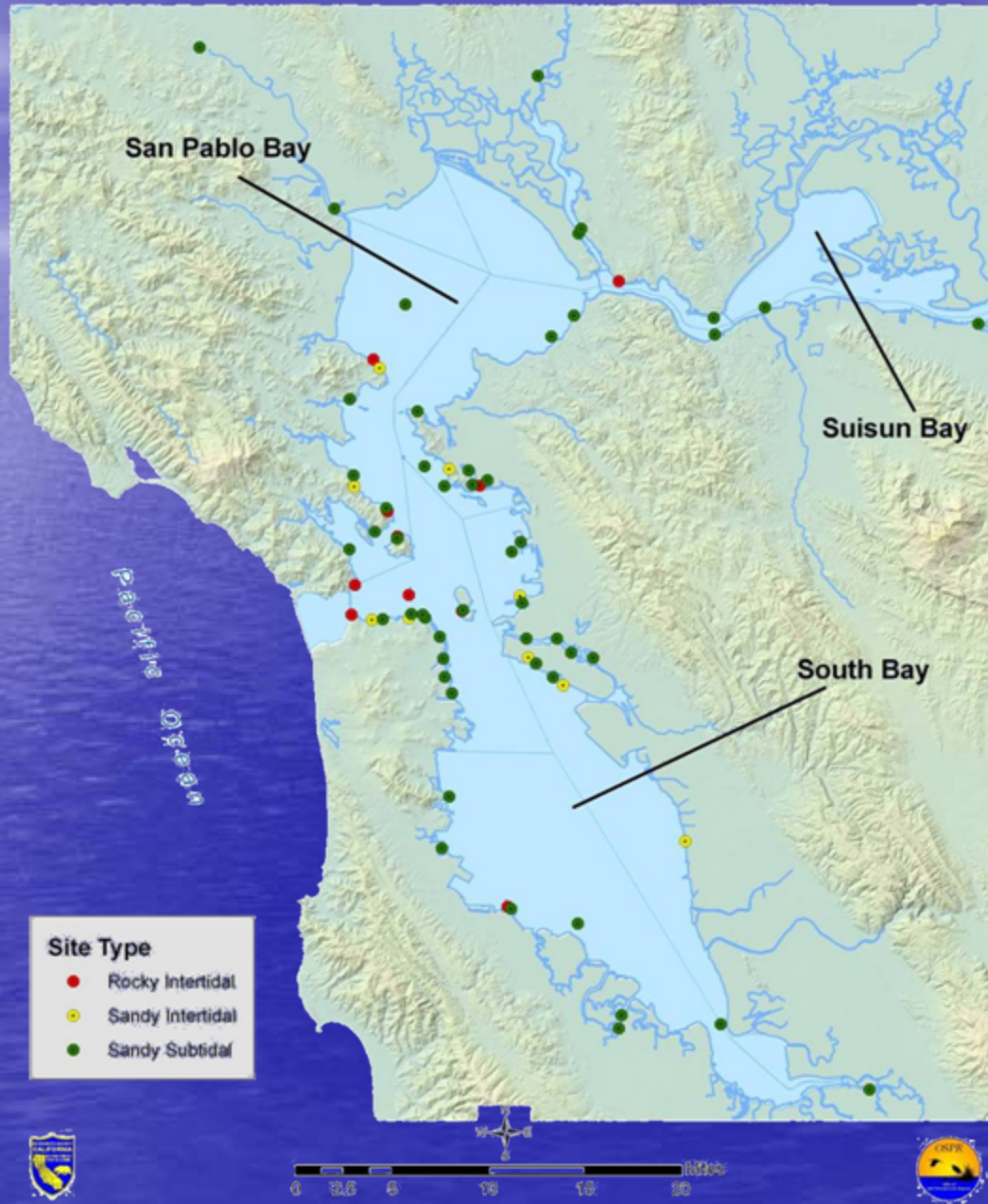
**1) Central Bay**

**2) San Pablo Bay**

**3) Suisun Bay**

**4) South Bay**

# San Francisco Bay Sampling Sites



# San Francisco Bay Survey

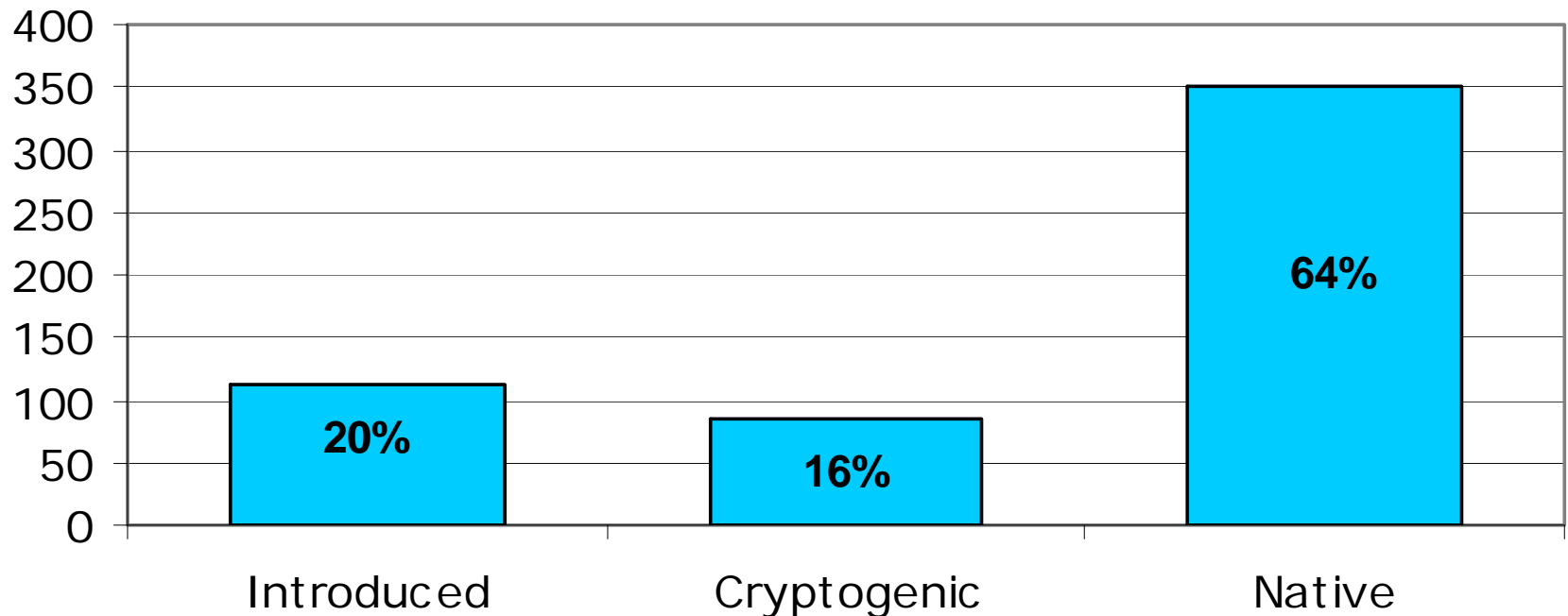
## Three Main Habitats

- 1) Epifaunal Intertidal
- 2) Sandy Intertidal
- 3) Infaunal Subtidal



# San Francisco Bay Survey

Number of Species per Classification



293 Unresolved Species: not identified to species level

# San Francisco Bay Survey

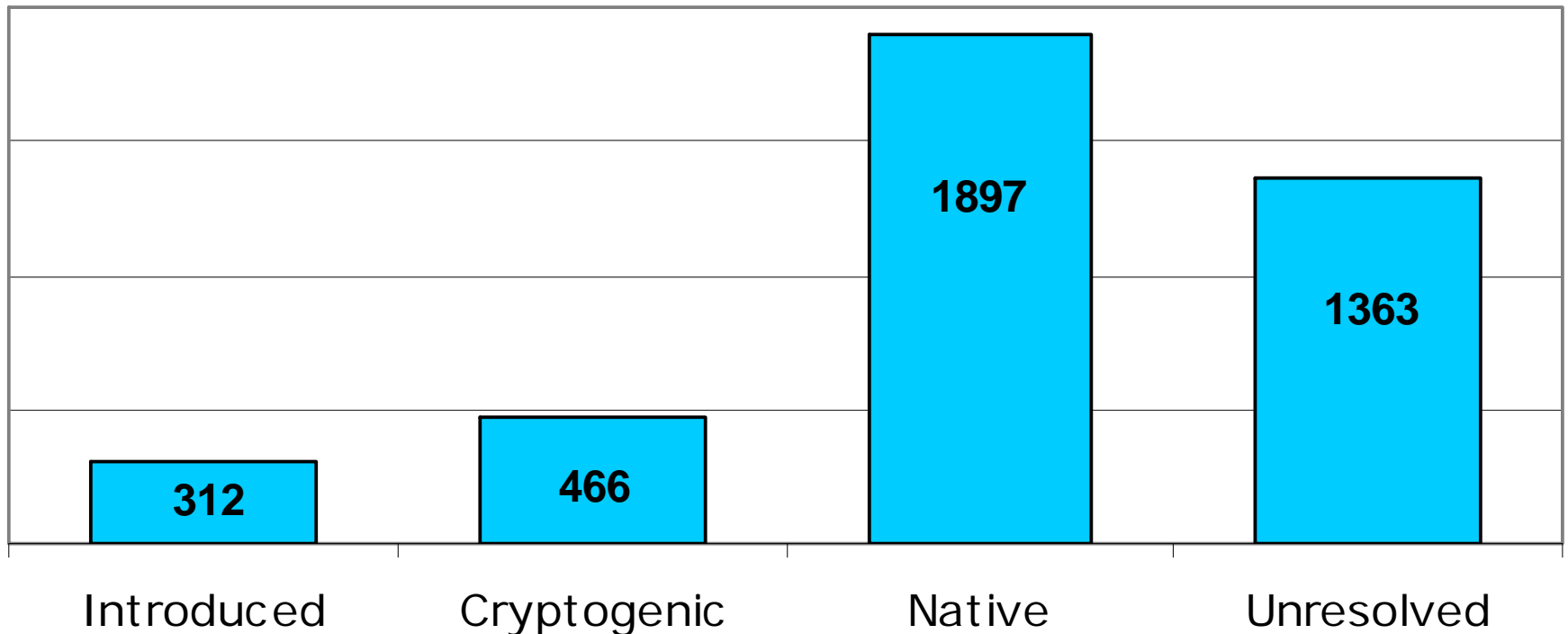
## Top Two Introduced Phyla:





# Statewide Results

Number of Species per Classification



# Vector Study

## What is a Vector?

A means to transport aquatic invasive species from their origin to a non-native region



# Vector Study

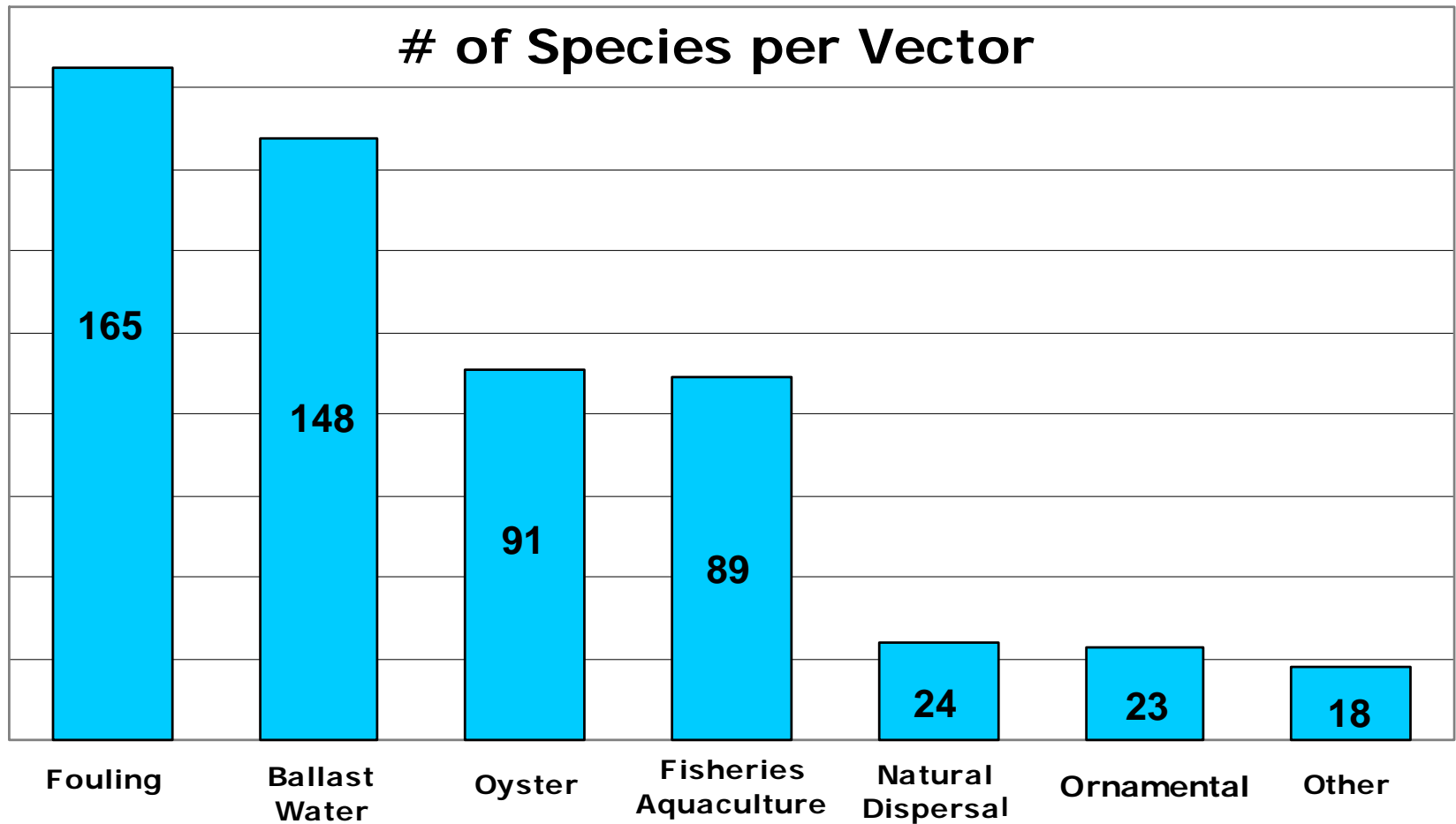
## Types of Vectors:



# Vector Study

- Introduced species were assigned a probable vector
- Vectors were summed
- Statewide totals were calculated
- Many species were assigned multiple vectors

# Vector Study



# Upcoming Projects

- 1) Legislative Report due January 2009
- 2) Create a long-term monitoring plan
  - Is the rate of new introductions increasing?

# California Aquatic Non-native Organism Database (CANOD)

- **Name of species**
- **Location observed**
- **Date of introduction**
- **Vectors of introduction**
- **Native region**

[illegible]

# Summary

- 1) 312 introduced coastal aquatic species statewide;
- 2) Most invaded area of CA is SF Bay, while Outer Coast is the least invaded area;
- 3) Most common vector is fouling closely followed by ballast water;
- 4) Our database, CANOD, can be found at:

[WWW.DFG.CA.GOV/OSPR](http://WWW.DFG.CA.GOV/OSPR)

Link to "Invasive Species"

# **QUESTIONS?**

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